GEOGRAPHIC NEWS BULLETINS

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ALL BAGGAGE GOES BY COOLIE IN SZECHWAN
(See Bulletin No. 1)

HOW TEACHERS MAY OBTAIN THE BULLETINS

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Szechwan, Western Outpost of American Missionaries to China

DISTURBANCES in China have prompted American officials to order missionaries in Szechwan Province to withdraw to the coast. It will probably take a month before the American men and women in Chengtu, capital of the province, can reach Shanghai, because Szechwan is so far inland. Chengtu schools are the western outposts of American missionary activity in China.

Szechwan is smaller than Texas by 45,000 square miles. But it has one-third as many people as the United States. People abound everywhere. In the Chengtu plain, one of the most densely populated areas in the world, there are 2,000 people to the square mile. They are scattered over the fields and swarm the village thoroughfares. Along the roads leading to the larger cities, one sees a continuous procession of half-naked, perspiring men, pushing sacks of farm produce to market on wheelbarrows.

Where a Wheelbarrow Is Freight Car and Pullman

Szechwan has no railroads. The wheelbarrow is both freight and Pullman car. When it is not laden with freight, a passenger is jolting along with a coolie trudging between the handles. The lower class are not the passengers. They walk. It is the wealthy citizen or the dignified scholar who travels in this squeaking, uncomfortable conveyance.

Freight that is not pushed in the wheelbarrows is carried in baskets tied to the ends of a flat pole which is swung across a coolie's shoulders. Bearing baskets weighing 40 pounds each, these human beasts of burden can trek 25 to 30 miles a day. They consume less than a pound and a half of dry rice for "motive power." It is not uncommon for them to keep up this pace for several weeks at a time.

One easily imagines himself in the heart of the Rockies when he is among the high peaks of the Szechwan Alps, which spread themselves over the western half of the province. But the eastern end of the province, though mountainous, more nearly resembles the round-crested Appalachians with their rolling foothills.

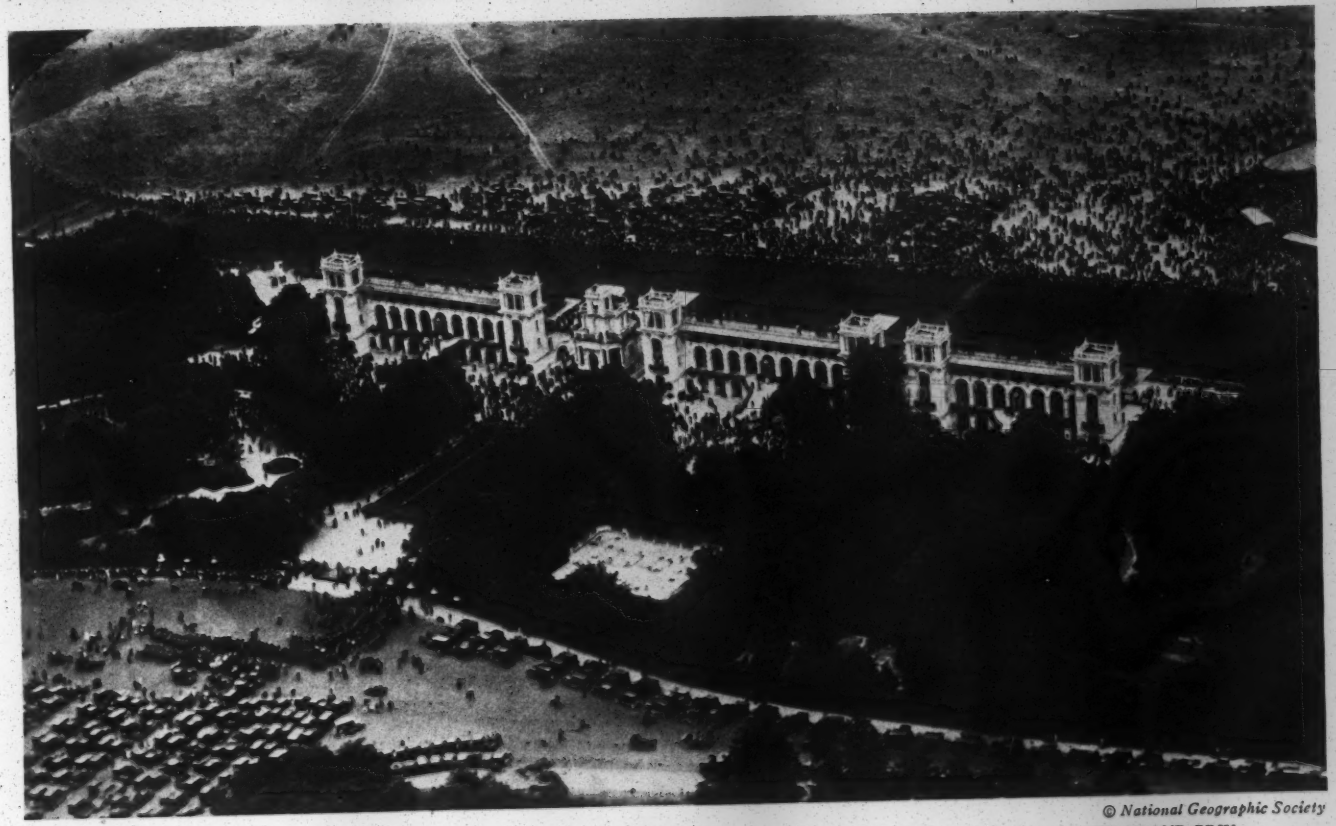
The mountains in the extreme southwest surround one of the least known spots in the world—the independent lama kingdom of Mili. The Mili king holds sway over 22,000 subjects living within 9,000 square miles of peaks and gorges. There is almost no level country in the entire area.

The King Who Knew Nothing of Oceans

The walled city of Mili, which is perched on the side of one of the mountains, is the capital of the kingdom. It is only a lamasery of about 350 homes where 700 monks live and pray unceasingly. There are 18 of these lamaseries—3 large ones and 15 small ones. Followed by his government, the king spends a year in each of the three large ones. Of the rest of his kingdom or elsewhere, he knows nothing.

When visited recently, the king did not know oceans existed. He thought all land was contiguous, for he asked if he could ride from Mili to Washington on horseback, and if Washington was near Germany. He also asked whether a king or president ruled China.

Old fashioned, rusty oil lamps are popular decorations in the houses of the ruler and the few well-to-do inhabitants. They are often observed hanging from



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AN AIRPLANE VIEW OF THE LONGCHAMP RACE TRACK, IN THE BOIS DE BOULOGNE, ON THE DAY OF THE GRAND PRIX

The first race of the season, held at Longchamp early in April, is a fashionable fixture, when the new spring fashions of the Paris modistes are seen in all their glory. The Grand Prix, chief of the French races, is run on the last Sunday of June, inaugurating the summer season. Boulogne is one of the suburbs which might be incorporated in a larger Paris (see Bulletin No. 3).

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The Ray Family, Which the World Is Eager to Know

SCIENTISTS studying rays have recently presented the world with another useful application of their power. Experts in both England and the United States predict the ability to "see in the dark" by the use of infra-red rays.

The automobile of the future may need no glaring lights at night. The future headlight, one scientist suggested, will send forth a ray which will illuminate only objects which the driver must avoid. Thus other automobiles, fence posts, the roadbed itself, when painted with a special paint, will gleam brightly under the invisible beams of an automobile infra-red headlight.

Rays of various kinds and their effects have almost monopolized the attention of physicists during the last few years; and it is in this field that some of the most striking discoveries and advances have been made by science.

What Are Rays?

What are the rays that lead serious scientists to remote parts of the earth and absorb the attention of scores of others in laboratories throughout the civilized world?

A little more than thirty-five years ago it would have been difficult to give a broad definition of rays. Furthermore, it would have been almost impossible to bring to the average mind any understanding of the various kinds of rays and the things they do. Light and heat rays were the only ones well known at that time, even to scientists.

To-day it is far different. In thirty-five years, rays previously unknown have become the aids of civilization. They speed commerce. They are the helpers of physicians, surgeons and dentists. They are the agents of scientists who are working toward discoveries. They are even the playfellows of children.

The Rays That Bring Us Radio

Any evening we can sit in our homes and be amused or instructed by one kind of ray—radio or Hertzian waves—as they bring voices or music to us over distances of hundreds, or even thousands, of miles. We know that these rays or waves reach us in a fraction of a second, however far away their point of origin. We know that they scorn our walls of brick and stone and steel. They come to an antenna inside our rooms as unerringly as to an aerial outside.

Many of us have had X-ray photographs taken of teeth or some other part of our bodies. We know that these rays can plunge through flesh and bone, wood or cloth, leaving on photographic plates records of things that eyes could never see. All of us are familiar, of course, with the streams of light rays that flood our rooms when we turn an electric light switch, and with the heat rays that flow from our fireplaces and radiators. Lately science has introduced us—or reintroduced us—to less usual rays that may be our familiar servants to-morrow: the gamma-rays of radium, the Cosmic or Millikin rays, the so-called cathode or beta-"rays" of the Coolidge tube, and the so-called alpho-"rays" of radlium.

Rays may be described broadly, though not very satisfactorily, as carriers of energy in straight lines from a given source through "empty" space. They may radiate from their source in all directions like pins stuck into a ball. By artificial means they may be gathered into beams like those of light thrown out by an automobile headlight or like beams of heat thrown out by a bowl-shaped electric household heater.

Branches of the Important Ray Family

The ray family is a large one, with numerous and diverse members. There are two groups: the true rays, and those with not quite so valid a claim to the family name. What might be called the true rays are often spoken of as "waves." The most generally accepted idea of their form is the wave theory. They are supposed to be waves in the ether, the "substance" that we assume fills "empty" space between the planets and stars—the same "substance" that fills a vacuum tube when all the air and other gases have been pumped out. These waves are thought to be like the widening waves made by a pebble dropped into water, first a crest, then a hollow, then another crest, and so on. They are measured from crest to crest.

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the rafters. That they are meant for decoration is obvious, as no kerosene reaches the king's domain.

In the central part of the province is the Chengtu plain, one of the garden spots of the world. The plain consists of 3,000 square miles of land which has been effectively irrigated for more than 2,000 years. The local farmers claim they can raise anything here that is grown elsewhere in the empire, and the traveler has only to glance across the landscape to be assured of the truth of their contention.

Where Five Crops Can Be Raised Each Year

Due to the irrigation system and ability of the Szechwan farmers, as many as three and, by special handling, five crops a year can be produced. Silk, wheat, sugar, tobacco, rhubarb, herbs, tea, bamboo, and wood oil are among the important products of the district. Poppy fields, which once covered a large part of this district, still add beauty to the plain, but China's fight against opium has decreased the area given over to the plant.

Every foot of ground in the plain, except that used for graveyards, is under cultivation. Farms are crowded in so thickly and are so diligently worked that the fields look more like garden plots than open country farms.

Chengtu, the metropolis of the plain, is likewise capital of the province and one of China's finest cities. It was once one of the three capitals of the empire.

Inclosed in a massive wall 9 miles in circumference, Chengtu is in reality two cities of widely different types with a high wall separating them. One is the Chinese city and the other the Manchu or Tatar quarter.

Half a million people live in closely built houses within the walls. A view from any high point presents a continuous mass of tile roofs interrupted only here and there by foliage. The streets are so narrow and so far apart that they almost escape detection.

Ruts in Stone Worn by Wheelbarrows

Chengtu's principal streets are paved with stone slabs and are kept clean. Parallel grooves, like wagon wheel ruts in our asphalt streets on a hot summer's day, catch the traveler's eye in the middle of the thoroughfares. They have been worn there in the stone pavement by passenger-carrying wheelbarrows which take the place of street cars and automobiles in Chengtu.

Trade routes pass through Chengtu leading to all parts of Szechwan, to Peking, central Asia, Burma and the coast. Much Szechwan produce is shipped over these roads. Some exports find their way to outside markets through the port of Chungking on the Yangtse Kiang.

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St. Denis, a City That May Be Incorporated in a Greater Paris

LIKE American cities, Paris has its growing pains. Chicago considers taking more suburbs under its direct government. New York already has done so. Paris joins this company by her recent debates on extending the French capital's boundaries to include St. Denis, Clichy, Neuilly, Montreuil, Vincennes, Aubervilliers, and other small municipalities.

Of these suburbs, St. Denis is one of the largest and best known. Outwardly St. Denis is one of the least attractive of Paris' neighbors. Most travelers on the Nord Railway from England or Belgium, who catch only a fleeting glimpse of its smoking chimneys and railroad yards from the car windows, are content to let it pass with a glance.

St. Denis, however, deserves more of the world's attention. Paradoxically this busy little industrial center of to-day is one of the mother cities of art. It also is the final resting place of some members of the royalty of France. Although little visited in comparison to Versailles or Fontainebleau, St. Denis has a church that was among the first churches to be built in the Gothic style. Some critics consider Gothic architecture the greatest single advance in temple building since Greek and Roman days.

Many Generations of Royalty Buried at St. Denis

Within the church is a veritable museum of French tomb sculpture. There repose marble effigies of thirty generations of kings, queens, and other nobility of France. In fact, from the tombs of St. Denis the names for an almost complete "Who's Who" of ancient and medieval France could be copied: Marie Antoinette, Duc de Berry, Catherine de Medici, Louis XIV, Louis XVI, Louis XII, and a host of other kings named Louis, Anne of Brittany, Maria Theresa, and Henry II. But the church was raided during the revolution and the remains of many ancient great ones scattered to the winds. Even the ornate figures on the tombs are, in many instances, reproductions of what more modern sculptors thought the old ones might have been.

It is into the well of legendary lore that one must dip to find anything of the city's early history. According to legend, St. Denis, the first bishop of Paris, suffered martyrdom on Montmartre in Paris about the year 270. He walked with his head in his hands to the site of the present Basilica of St. Denis. On the initiative of St. Genevieve the clergy of Paris built a chapel over his grave two centuries later.

The place soon became a mecca for religious pilgrims from all parts of France. In the twelfth century Abbe Sugar reported that he saw worshipers crushed to death by the crowds pressing in behind them. It was obvious that the small chapel first erected was inadequate. When Sugar came into control he enlarged the crypt, and above it built a choir, with tall, slender columns supporting the intersecting arches of the vault—in short, Gothic style.

Pilgrims Spread the News of the Building Experiment

Although the new style of building was not originated at St. Denis, it had never been very seriously considered by former builders. They did not believe it possible to support heavy roofs without heavy, massive walls. Pilgrim reports of the success of the venture at St. Denis resulted, for a time, in wholesale trans-

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This narrower definition which emphasizes the supposed wave form fails to include what are often loosely spoken of as "rays": the cathode rays of the Coolidge tube and the alpha and beta rays of radium.

Consider first the true rays. They are all near relatives because they all move with the same velocity. Their uniform speed is the speed of light, approximately 186,000 miles each second. The true rays, although they travel with the same speed, differ in their wave lengths, that is, the distance between crests. Therefore they differ in the frequency of their vibrations. In this they resemble the waves of sound which travel through the air. Although all sound waves travel at one speed, they may range from slowly vibrating low sounds to rapidly vibrating high-pitched sounds. The great range that rays run may be thought of as the keyboard of a gigantic piano on which they are grouped in octaves.

Near the middle of this imaginary keyboard is the octave we know best, that of the visible light rays. These rays bathe us continually by day from the sun and by night from electric and other lights. As we go from violet colored light, with the shortest light waves, toward the "bass" end of the keyboard, these rays have longer and longer wave lengths. Finally we reach the red rays, the longest that will illuminate an object for the human eye.

The next longer waves and all others beyond them toward the "bass" are invisible. Those in the octaves closest to visible light make themselves known by their heat. We can feel them radiating from any hot body. Next come the relatively short Hertzian waves for which few uses have been found. The lengths of Hertzian waves vary from slightly more than the thickness of a sheet of paper to lengths of many miles. When we encounter Hertzian waves of 100 meters (109 yards) or more in length we enter the realm of the most widely used radio waves.

Going back to our starting point, the visible light octave, and tracing rays along our "keyboard," this time toward the "treble" end, we again enter a range of invisible rays. The first of these, covering about five octaves, are the ultra-violet rays. Nearly an octave of these reach us from the sun. These sun rays, shorter than those of violet light, do not illuminate objects to our eyes, but they make their existence known by tanning and freckling our skin. They also produce photographic and chemical changes. These waves are so short that it takes from 64,000 to 100,000 of them to make an inch.

Beyond these "natural" ultra-violet waves that reach us from the sun—still toward the "treble" end of the scale—are several octaves of other (artificially produced) ultra-violet waves. These are radiated when substances are brought to very great heat. There are more than a million and a quarter of these shortest ultra-violet rays to the inch. They merge into and even overlap the next great group, the well-known artificially produced X-rays. Thus a short ultra-violet ray is the same as a long X-ray, and vice versa. X-rays were for a long time the shortest rays known to exist. It takes more than 125 millions of the shorter artificially produced X-ray waves to make an inch. These exceedingly short rays are not stopped by ordinary materials. They plunge into or through them so that with them we may make photographs through boards and other objects. A fraction of an inch of lead does stop them, however.

The discovery of radium brought to light still shorter and more penetrating rays given off by that mysterious element. These may be called "naturally produced" X-rays, but they have been given the distinctive name, gamma-rays. Of the shortest gamma-rays, it takes more than 4 billions to make one inch. Gamma-rays will plunge through 7 or 8 inches of lead before being stopped.

The reason that the shorter rays penetrate matter is supposed to be that the waves are so short, in comparison with the molecules of matter and the distances between the molecules, that they pass through the space just as a breeze passes through a window screen. But many thicknesses of screens will stop a breeze, and so a sufficient thickness of lead or other matter will stop even the shortest rays.

Until 1925 the gamma-rays of radium were the shortest rays known, but in that year Professor Millikan discovered the Cosmic or Millikan ray, a natural ray coming to the earth from outside space but apparently not from the sun. This ray is almost inconceivably short. It would require more than 630 billions of them to make one inch. They will pass through more than 6 feet of lead before being stopped.

A convenient summary of one branch of the ray family follows:

Approximate range of ray or wave expressed in number of waves to the inch.	*Name of ray or wave.*
63 to 31,750	Heat Ray
31,750 to 63,500	Light Ray
63,500 to 1,870,000	Ultra-violet Ray
249,000 to 181,428,000	X-ray
181,428,000 to 4,233,333,333	Gamma-ray
635,000,000,000 (range unknown)	Millikan or Cosmic Ray

The Hertzian rays are the longest of the ray family. The longer Hertzian waves are radio waves, ranging from 254 to the inch to 18.6 miles between crests.

The overlapping in range of the ultra-violet rays, X-rays, and gamma-rays is accounted for by the fact that all gamma-rays and some ultra-violet rays also are X-rays.

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The Hottentots, Who Talk Like Their Name

THE NEAREST neighbors to two American scientists operating the National Geographic Society's Solar Radiation Observatory on Mt. Brukkaros in South West Africa are Hottentots living in a village 6 miles away.

Some months will pass before the scientists on their lonely post will learn to converse with their neighbors. Hottentots speak like their name sounds. On Mt. Brukkaros the scientists have set up delicate instruments to take the daily temperature of the sun. They will cable the figure to Washington, where scientists hope to use the data for long-range weather prediction.

"Hottentot" represents a Dutch effort to imitate the tribesman's speech, which cannot be spelled in Dutch, English or any other language. But after all, his quaint clicking and clucking is not so different from the method by which a farmer summons his chickens, or the plain "tut, tut" of anyone who is annoyed.

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MAP OF SOUTH WEST AFRICA, HOME OF THE HOTTENTOTS, SHOWING THE LOCATION OF THE NATIONAL GEOGRAPHIC SOCIETY'S SOLAR RADIATION OBSERVATORY ON MT. BRUKKAROS

Call Themselves "Men of Men"

Language experts have done better by Hottentotese than they have by our own language. They have devised symbols for tongue tricks that resemble the cracking of a whip and pulling a cork from an empty bottle. Yet these and other symbols of our own everyday use can only be described, not written.

If you will pronounce the three syllables of "Hottentot" with snap and vigor you will gain an idea of the style of their language. Hottentots call themselves Khoi-Khein, or "men of men."

Formerly the Hottentots ranged through most of southern Africa. To-day they are to be found mostly in the Cape Colony and in South West Africa. Few pure-blood Hottentots remain even in those places. Their origin long formed a fascinating problem for students of human races. Some thought they were an offshoot of the Caucasian peoples, isolated in prehistoric times. Others believed them to be the missing Hamites. At present they are generally classified as a blending of many centuries ago between the Bantu natives and the Bushmen.

There are some surprising parallels between the customs of this primitive people and those of our own civilization. They are good conservationists. They

formations of churches from sturdy Romanesque into airy Gothic. The Gothic style is being employed to-day in the new cathedrals at Washington, D. C., and at New York City.

Many personages and high lights of world history have been intimately associated with the Basilica of St. Denis. One of the popes, Stephen III, took refuge here from the Lombards. Charlemagne, founder of the Holy Roman Empire, was anointed by the same pope during his residency at St. Denis. Joan of Arc dedicated her armor on its altar. Here Napoleon was married to Archduchess Marie Louise. Once it was sacked by the English. During the French Revolution, however, it suffered most. Tombs were rifled, and the Basilica itself, deprived of its leaden roof, was used as a granary. Since 1895 it has been a simple parish church.

Mark Twain's Thoughts at St. Denis

Mark Twain found the sculpture of St. Denis particularly impressive—so impressive, in fact, that he placed Charlemagne's tomb here, although he is really buried at Aix. "It seemed curious," he wrote, "to be standing face to face, as it were, with old Dagobert I, and Clovis, and Charlemagne, those vague colossal heroes, those shadows, those myths of a thousand years ago! I touched their dust-covered faces with my finger, but Dagobert was deader than the sixteen centuries that have passed over him, Clovis slept well after his labor for Christ, and old Charlemagne went on dreaming of his paladins, of bloody Roncesvalles, and gave no heed to me."

The present city of St. Denis is linked with Paris by railroad, highway, the river Seine and a canal. Due to the great bends of the river Seine in the vicinity of Paris, the journey is more than three times as long by water as it is by road or railway.

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A MIRROR TO CATCH THE LIGHT RAYS, THE BEST KNOWN MEMBERS OF THE RAY FAMILY

This hundred-inch mirror has been installed at Mt. Wilson Observatory, California. It is the largest ever made. With it astronomers have made a close study of the sun which is the source of light, heat and ultra-violet rays (see Bulletin No. 2).

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Isle of Wight: Gatepost to England

SOUTHAMPTON, where thousands of Americans land each year to begin tours through England and Europe, has adopted a plan for dredging its channel to the sea.

As the liners steam into The Solent, the English mainland lies to the north. To the south is the Isle of Wight. Most tourists landing at Southampton hurry on to London, neglecting this charming island which is an English playground.

The Isle of Wight is a geographical Siamese twin. Two parts of it are joined by a low, marshy isthmus. Recently the English Channel again threatened to sever the two sectors of the island.

This isthmus is but a few feet above the ordinary spring tides. The sluggish river Yar rises in the vicinity of the village of Freshwater and flows north through the marshy isthmus to The Solent. Its source is in a number of springs which are so little raised above the sea and are so near the beach at Freshwater Bay that the waves from the Channel splash into these springs during periods of extremely high tides. The Yar then presents the peculiar phenomenon of a river of flowing salt water.

Where Alfred Tennyson Wrote

The section threatened with isolation is particularly endeared to the islanders as the home, for forty years, of Alfred Tennyson. On the top of one of the hills, or downs, is the home he called Farringford, clothed with ivy, almost buried in trees and flowers, and swept by the breeze from the sea. Here the poet produced many of his great works, and the effect of the natural beauty of his surroundings can be traced in much of his poetry. It must have been the surf below Farringford that inspired him to write:

"The voice of the long sea-wave as it swelled,
Now and then in the dim-gray dawn."

The main body of the Isle of Wight is significant to the English mainly as a health and pleasure resort. At Cowes, on the north shore opposite Southampton, is held the yachting (and social) classic of the empire each summer. Ventnor, Shanklin and Sandown are famous watering places along the east shore. Inland are so many golf courses that a British wag has suggested that the name of the island should be changed to "Foreland."

But *the* island, as the natives refer to it, which is about twice as large as the District of Columbia, is not wholly a region of bath houses and flying golf balls. Long stretches of the coast reveal dazzling chalk cliffs and booming surf, while inland the beautiful downs unroll their carpets of soft green bracken and purple heather, with distant glimpses of the blue sea. Little inns along smooth, winding roads, and cottages smothered in flowers complete an idyllic picture.

The Private Wight Hall of Literary Fame

Tennyson was not the only writer who drew inspiration from the island's store of beauty. Natives of Shanklin will tell you that Keats, one of the "discoverers" of the island, lived and wrote in that terraced village by the sea. At New St. Boniface, close to a convent bell and a rookery among the elms, is the

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camp in places where pasture lands are rich, but move before the grass has been worn out. Their exercises upon settling in a new kraal resemble rural American "house warming" ceremonies. Women bring flowers, herbs, and foliage to an arbor which forms the center of the homestead. Their chiefs levy a tax upon hunters consisting of certain quarters of the animals killed and distribute this meat to the poor. But this communal care does not extend to the aged or to children who are deformed or crippled. Frequently both are killed.

Wedding Breakfast an All-Day Feast

When the young Hottentot wishes to marry he informs his parents. They choose a wife by arrangement with the father of a likely maid. Then the prospective bridegroom and all his relatives drive several fat oxen to the home of his fiancee. The oxen are slain for the wedding breakfast, which is an all-day feast. A tribal patriarch sprinkles the couple in a manner suggestive of Christian baptism. Then the young man goes off to his hunting, and his bride does all the other work. Her son will be known by her family name, and a daughter by the family name of the father. As a mother she will command high respect, and in her name her husband and sons will take any especially sacred oath.

Despite his ferocious reputation, the primitive Hottentot seldom engaged in war. He was judged gentle and tractable. His most explosive quality is his language, now rapidly disappearing. There was little reason for the Hottentot to fight, since all he requires for his simple communal life is a patch of grass. In the evening he dances and sings and smokes. His musical instruments are few. The characteristic orchestral piece is the "gorah," a crude sort of mouth organ made out of a hollow stick. A drum and a reed, which have the quality of a flute, complete the orchestra.

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PLAYING A GAME POPULAR AMONG HOTTENTOTS AND OTHER AFRICAN TRIBES

Soombi and Okwe are two of the many names for a game almost universal in Africa. The playing board has from 10 to 20 holes on a side. Counters are seeds, and the victor may eat his winnings. The game has many points in common with checkers and chess and is a favorite with elderly men. Quarrels often occur between players. Then the tribal chief may prohibit the game—for a time.

grave of Swinburne. Others who have visited and written about the island include Henry Fielding, Michael Drayton, Charles Kingsley, Bayard Taylor and Oliver Wendell Holmes.

The island and its location often remind Americans of Mt. Desert Island, off the coast of Maine, only chalk cliffs replace those of granite, and the mountains on the American island are higher.

Geologists and naturalists find the island a compact natural laboratory, with rock layers so exposed that one authority says "it might have been cut out by nature for a geological model illustrative of the principles of stratification." Through the center of the island is a backbone of chalk downs. To the north are wooded hills. To the south are beds of sand and marl ending in the chalk cliffs, "chines" or ravines, pinnacles, and with towers (like "The Needles") rising from the sea. The hills and "chines" are overrun with ivy and honeysuckle, and interspersed with thickets of hazel, briers and blackthorn.

Caves That Once Protected Daring Smugglers

Along the southern shores are many interesting caves like those of Capri, in the Bay of Naples, and other formations wrought by the beating of the waves. Some of them were once the dens of smugglers. When the sea is rolling and the sky is gray, it is said the spirits of the old adventurers again unload their kegs and store them in the black caverns below the white cliffs.

The climate of the Isle of Wight is the mildest in the British Isles. Snow seldom falls and does not last. High winds and chilling fog alone prevent its rivalling the French Riviera. Its spring is far ahead of spring in the rest of England. Its autumn, due to the tempering effect of the water, is long and delightful.

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ON THE CORNISH COAST WEST OF THE ISLE OF WIGHT

English families like to take cottages on the Cornish coast for the vacation season. Here they enjoy the sea and one of the finest climates to be found in England.